

Intercept Technology for Use in Protecting Army Assets from Corrosion

Presented by the
Intercept Technology Group

Represented by Randy Dutton, FPM
Inc. VP



Intercept Technology

- Bell Labs developed to provide:
 - **Permanent ESD protection**
 - **Long term corrosion protection**
 - Ultra-clean “**clean room**” packaging
 - No or limited outgassing
 - No or limited Non-Volatile Residue (NVR)
 - No or low ionic contamination
 - **Passive biological inhibition** (anti-mold/mildew)
 - **Safe** packaging for personnel / equipment
 - **Recyclable**, environmentally friendly

Electrical Static Discharge (ESD) Properties

- **Permanently Static Dissipative** - 10^6 to 10^8 Ohms/Sq
- **Humidity / Temperature / Moisture Independent**
- **Contains no volatile additives** - no or low outgassing (Meets NASA and Raytheon outgassing specifications)
- **Tribo Charging < 20 volts**
- **Clean room compatible** - no sloughing
- **CDM (charged device) Safe**

Electronics Corrosion Damage Prevention:

- Latent Defects**
- Soldering Problems**
- Low Yield**
- Increased Resistance**
- Reduction in Performance**
- Poor Connections**
- Physical Discoloration, Staining**
- Contamination**

Corrosion Prevention

Properties

- Keep the corrosive or reactive gases away from the surface of the material
- Scavenges the corrosive gases trapped inside
- Provides a preferential corrosion site
- Provides a sacrificial anode to protect against galvanic corrosion upon intimate contact
 - Such as using a zinc coating to protect the keel of a boat
- Sends a small electrical charge across the surface or through the circuit (Faraday Cage)

Common Corrosive Gases Neutralized by SSRB Technology

- **Ozone (O_3)** - reactive oxygen
 - A shelf life problem with rubber, paper, and plastic
- **Hydrogen Sulfide (H_2S) & Sulfur Dioxide (SO_2)**
 - Effluent from pulp mills, oil refineries, heavy industry, fossil fuel combustion and decaying vegetation
- **Carbonyl Sulfide (COS)**
 - Produced from fossil fuel combustion, wood fires and ocean surfaces
- **Nitrous Compounds (NO_x)**
 - Including amines, amides, ammonia, nitrates, nitrites

How Intercept Works

Water and Corrosive Gases

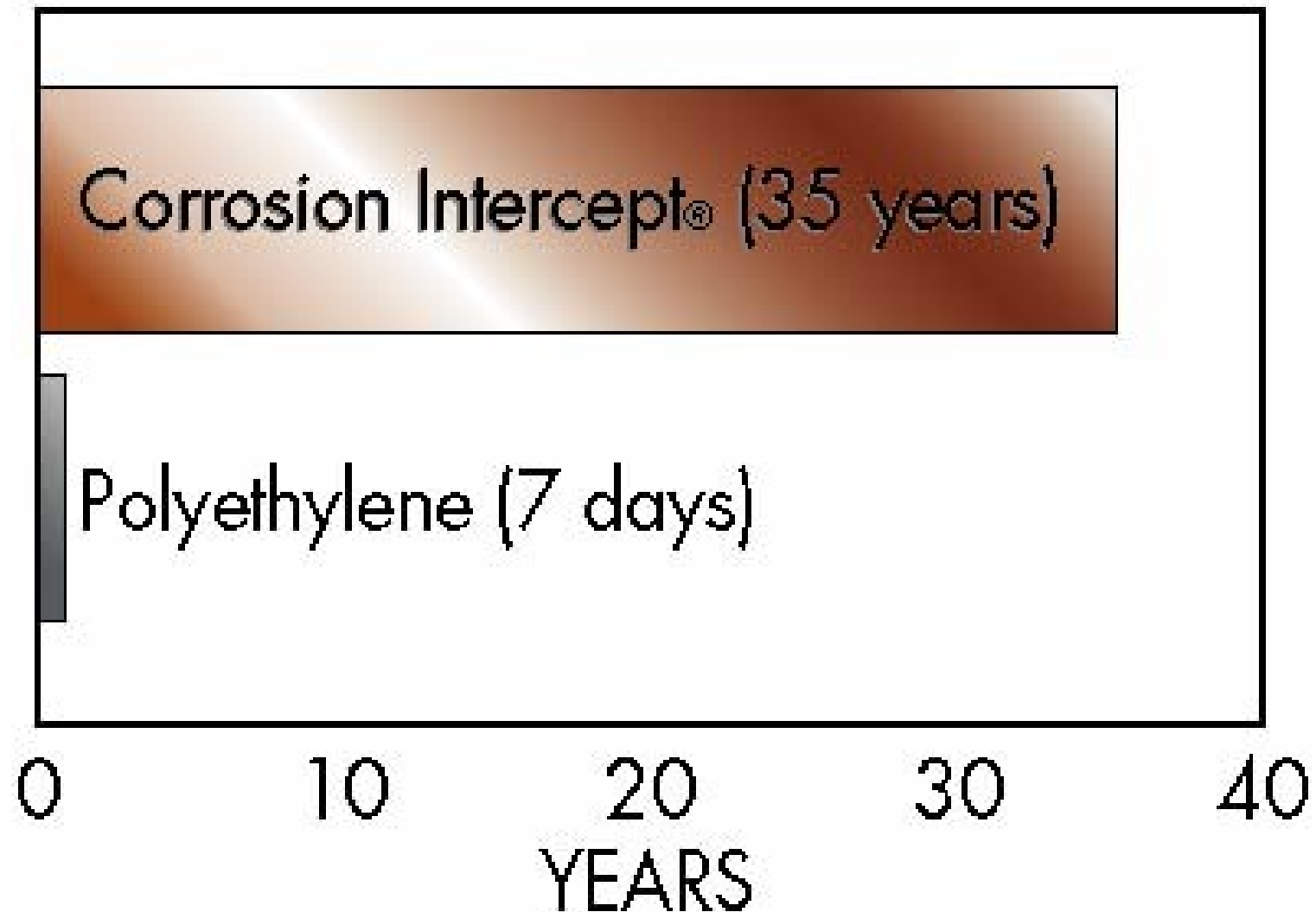
- Corrosion is caused by the **reaction** of these corrosive gases and the metal surface
- Water helps the process go faster as well as drops of water (condensate) can leave staining on the surface as well as cause rust

Intercept acts in three primary ways:

1. Intercept acts as a **gas barrier** - reacting with and neutralizing gases as they try to penetrate bag
2. Intercept acts as a **preferential corrosion site** inside the bag - creating a clean, micro-environment
3. In intimate contact Intercept can act as **sacrificial anode**

DuPont Chlorine Test

Years to breakthrough, 1 ppm Chlorine
Time chlorine takes to penetrate 2 mil plastic



Tested Intercept Products meet:

- **DEF-STAN 81-41** – English MoD Defence Packaging Authority
- **MIL-PRF-131J** (in selected applications)
- **TACOM VCI-Free Packaging Program**
Goals
- **MIL B 81705-C**
- **NASA SP-R-0022A**
- **FED STD 313D** definition of Non-hazardous

Reasons to Use

- **Save Manpower**
 - **Reduce Shelf-Life Extensions**
 - **Reduce stock rotation**
 - **Reduce product order oversight**
 - **Reduce MSDS's** required (eliminate hazardous preservative use)
 - **Reduce time** required to seal bags / enclosures / boxes
 - **Reduce or Eliminate** equipment rework / disposal

Reasons to Use

Save Money & Time

- **Extend** product **shelf life**; **improve** product **appearance**
- **Increase** buying **efficiency** – allows quantity/size requirement increase
- **Increase** purchase **options** – new products with wider selection
- **Increase** quantity packaging **selection**
- Provides **re-usable** packaging
- **Maintain proper storage** – in-transit, depot, field
- **Reduce Waste** – turn-in material maintained in usable condition
- **Increase** design **flexibility** – allows reduction of other preservatives; increases product purity (contamination) and function

Safety

- Non-chemical emitting, Non-offgassing
- Meets Class 10 clean room requirements
- Non-shedding
- Cannot damage equipment
- Does not require personal protective equipment under normal use
- Does not contain VCIs or VOCs.
- VCIs now are severely restricted by 2003 German TRGS 615 Regulation, with likely future EU restrictions. More at [**www.VCIproblems.com**](http://www.VCIproblems.com)

Cost Effective

- **Protects longer**
- **Saves time** – doesn't require a perfect seal
- **Eliminates Re-work**
- **Extends Shelf-life** of many items
- Reusable in many forms
- Is **recyclable** as colored polyethylene -
Meets German Green Dot recycling standards
- **Eliminates** need for **PPE** and **hazmat** training and shipping **documentation** required for hazardous preservatives
- **Eliminates** many **depreservation** requirements

Intercept Products

Protects

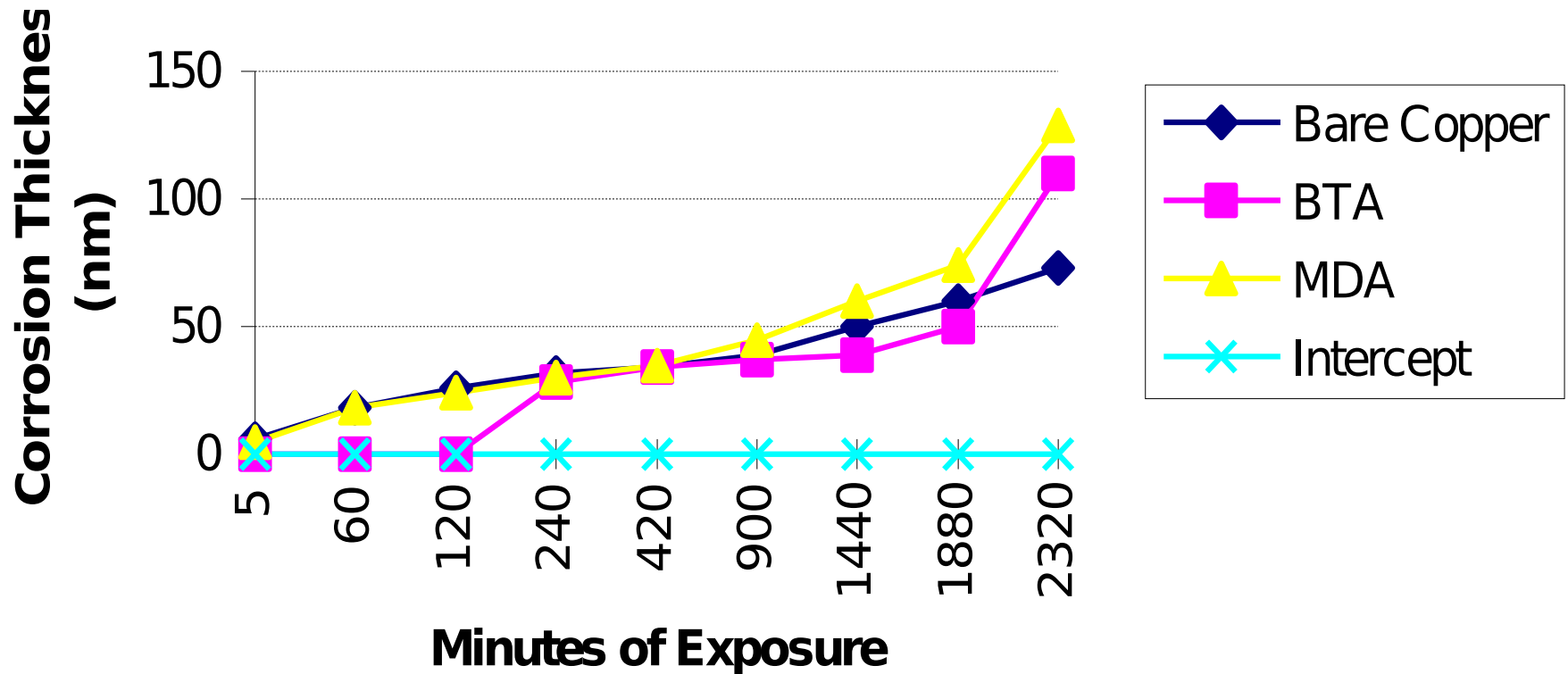
- Protects for up to **10 years** per mil of resin
- **Humidity independent**
- **Temperature independent** up to 170°F
- **Protects all metals, optics, electronics, computer drives, elastomeric compounds, paper, CDs, most explosives, and more**
- Protects without perfect packaging seal

Corrosion Protection of Copper

Versus

Industrial Coatings

Intercept vs. Industrial Inhibitors



Note - Copper would have been better protected without the

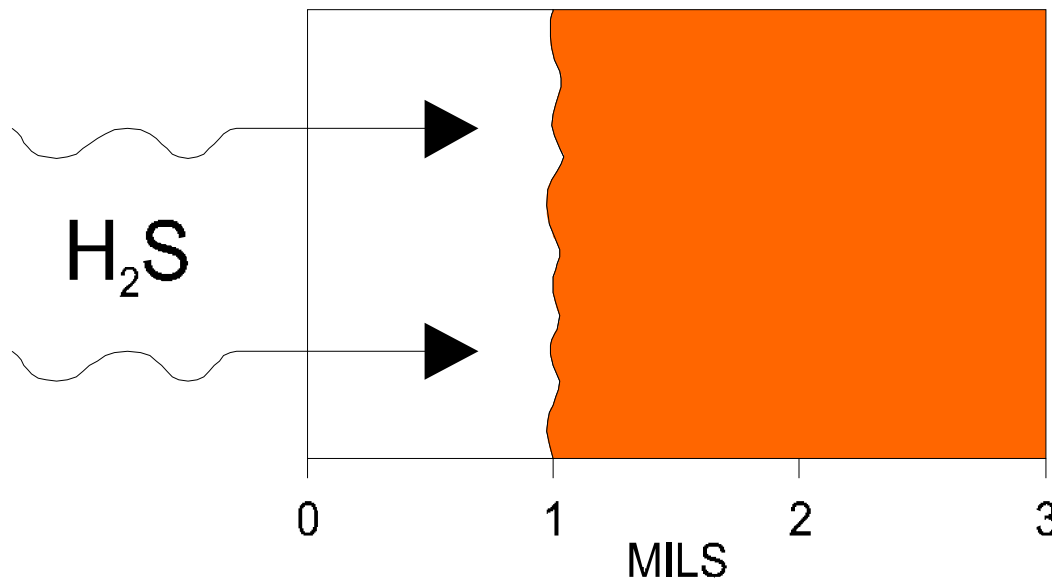
INTERCEPT IS NOT A VCI

Bell Labs Testing

Corrosion Intercept

10 Year Exposure at 7 ppb

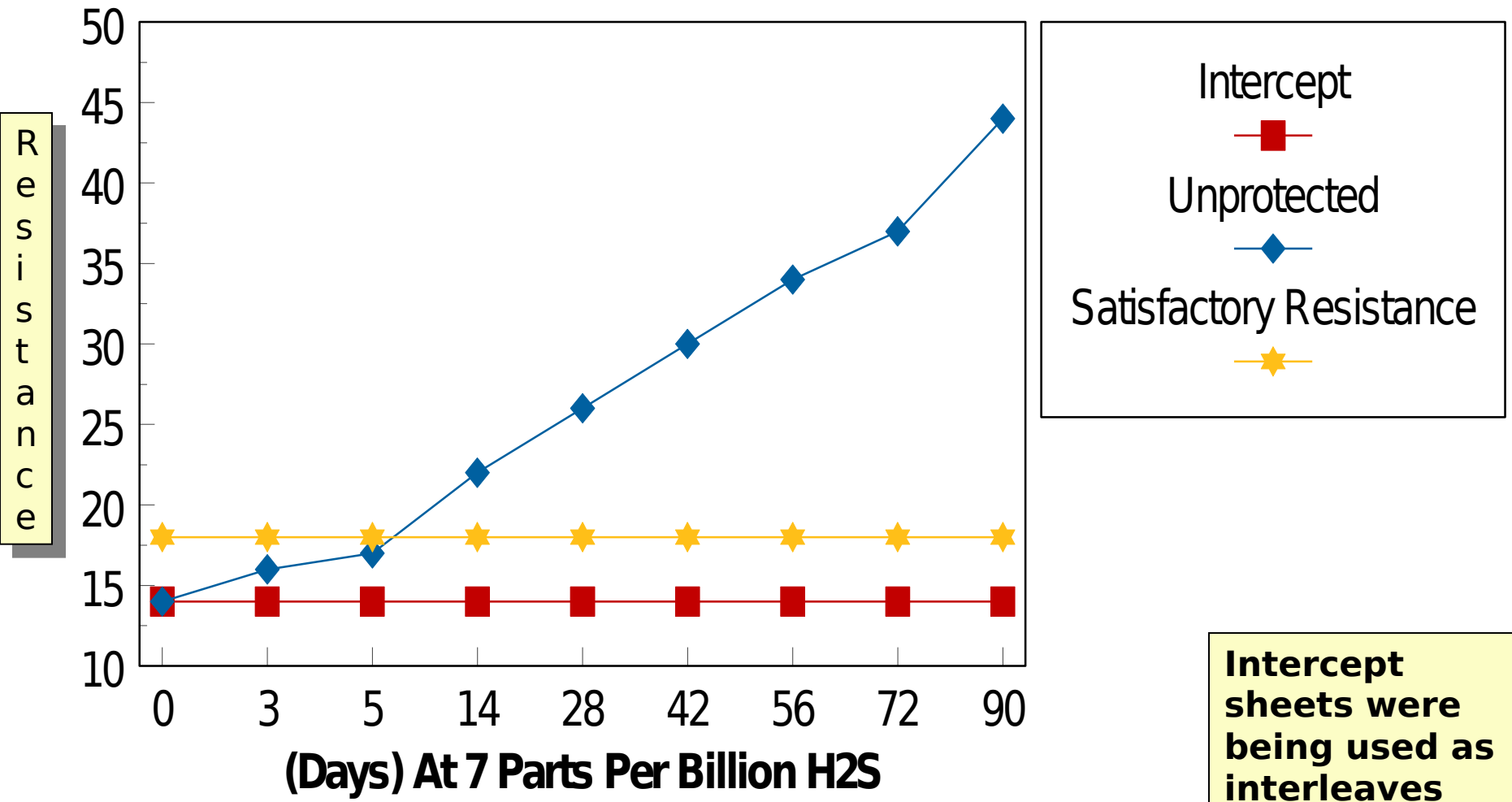
Corrosive Gas Penetration



Copper Bus Bar Exposure

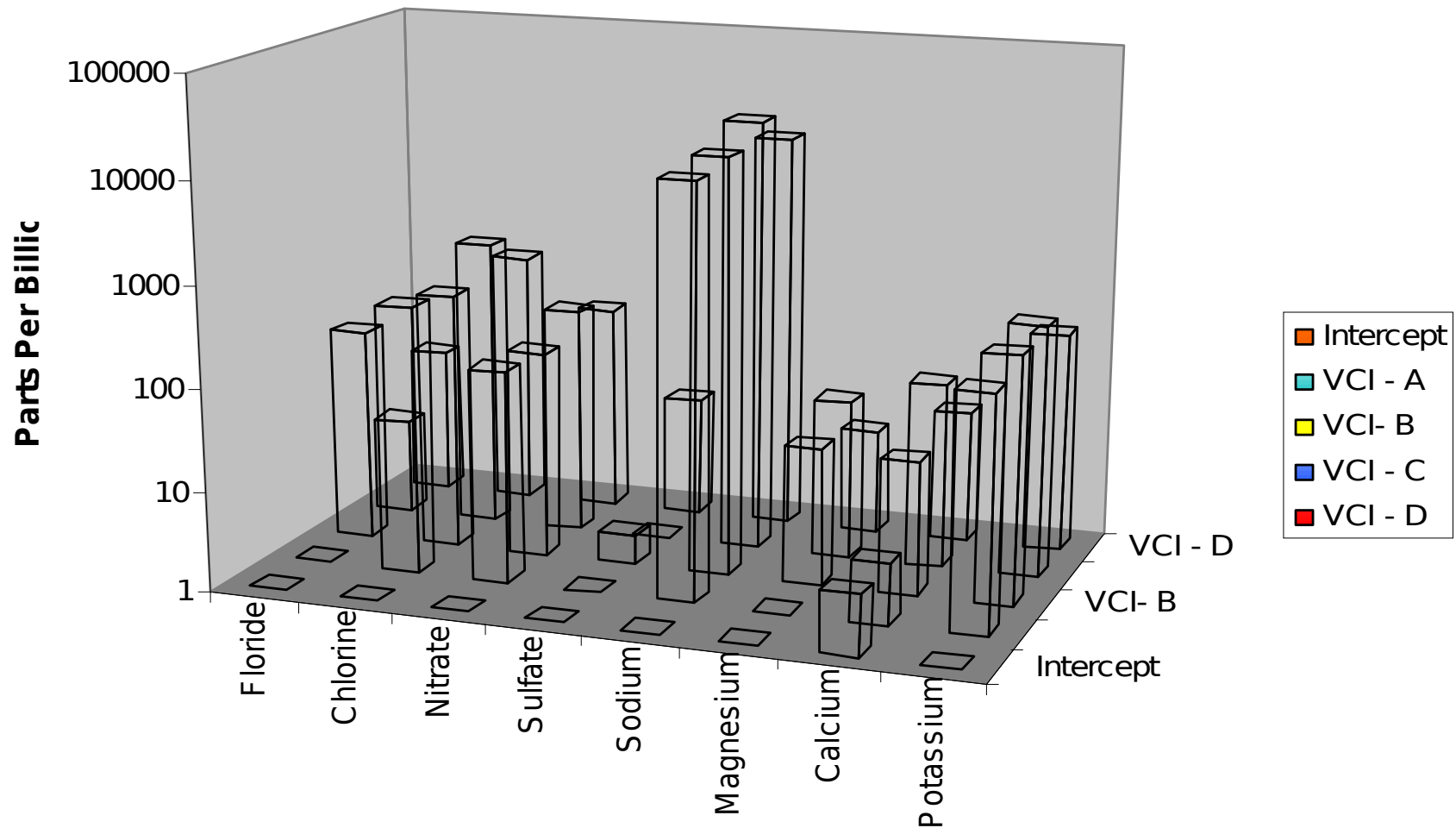
Junction Resistance of Copper Bus Bars (Micro Ohms)

Metals Become Insulative as They Corrode



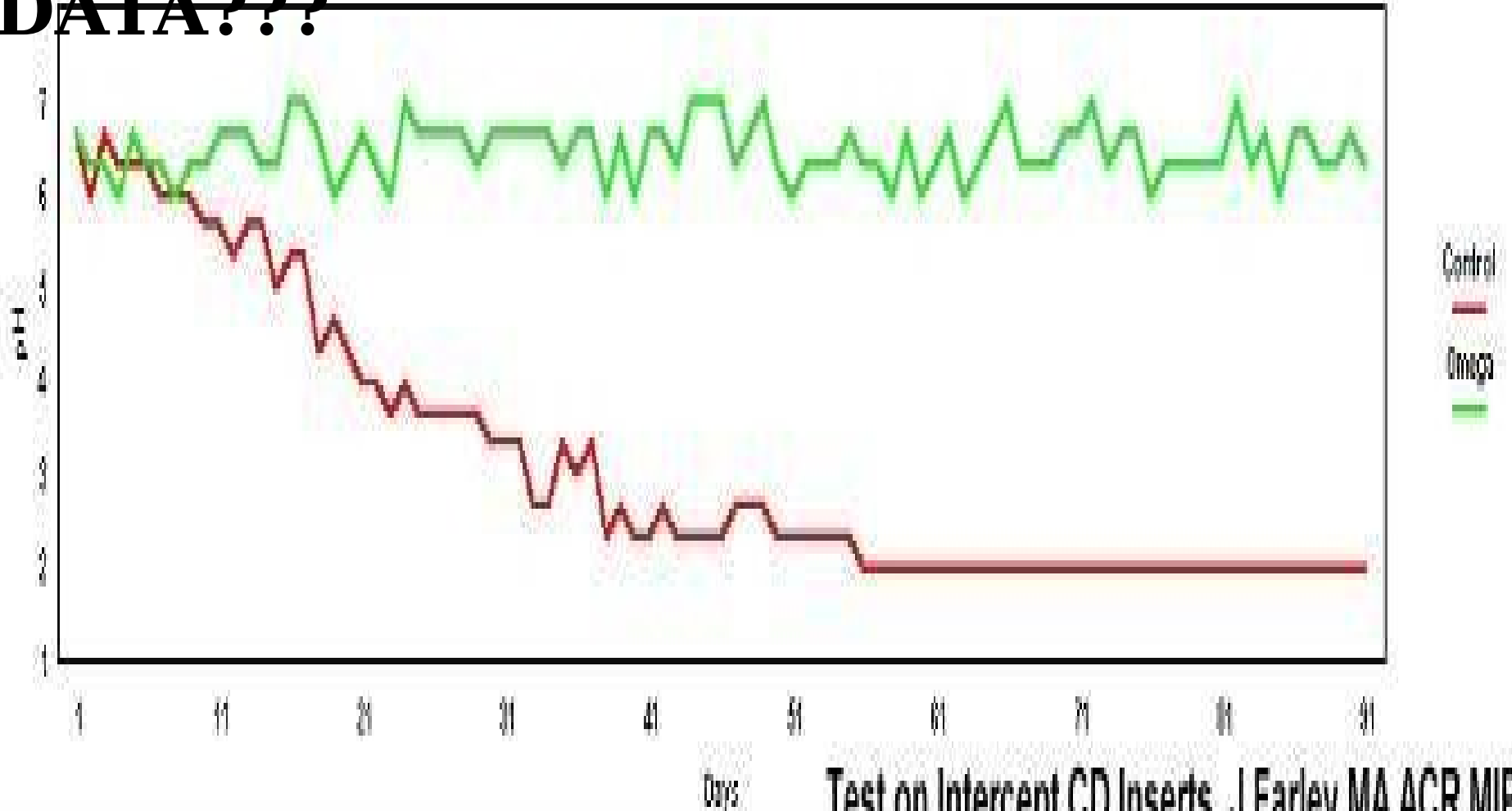
Ionic Contamination of Commercial Films Currently Sold Into the Electronics Industry

PPB of Ionic Constituents



How important is your DATA???

Indicator Strip
Measurement of internal atmosphere
over 91 days



Test on Intercept CD Inserts, J Farley MA ACR MIPC

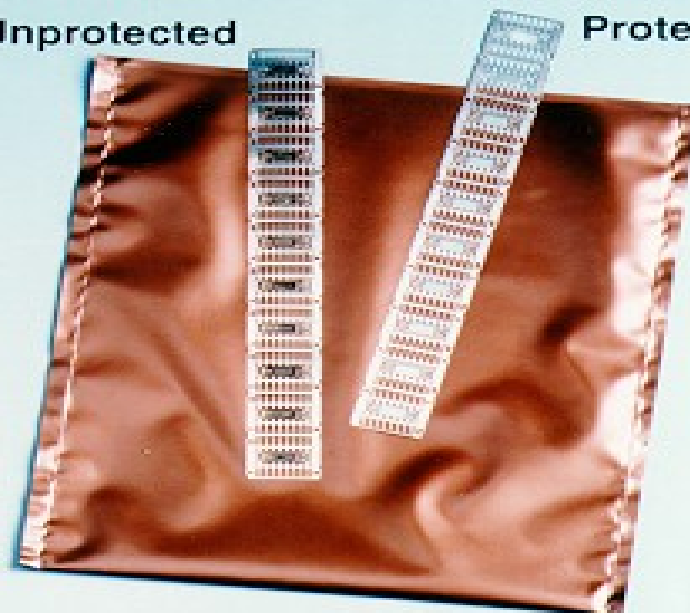
Protected

Unprotected



Unprotected

Protected



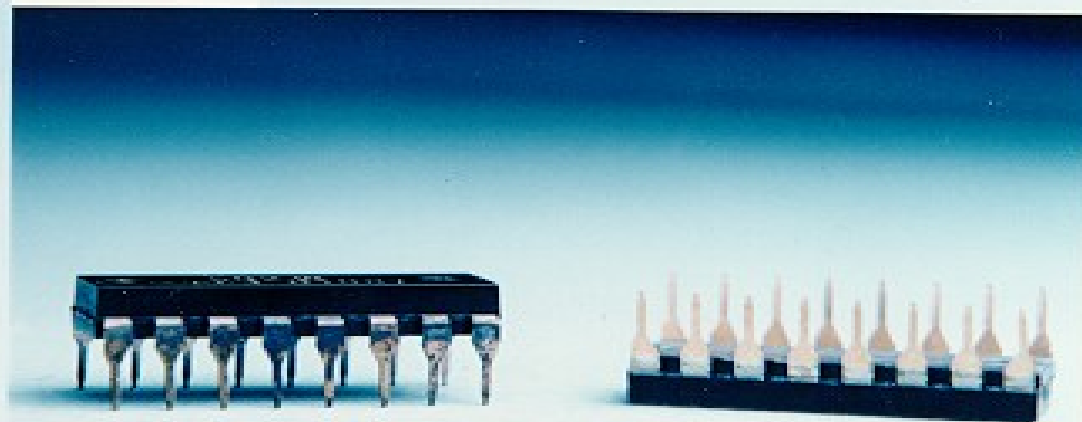
Protected

Unprotected



Unprotected

Protected



Some Applications

- **Shelf Life extension** by **eliminating ozone** deterioration
- **Indoors/outdoors** depot & forward deployed shipped & stored vehicles, aircraft, ships, equipment, materials
- **OEM shipped** items needing protection AND item **access** (Customs, inspection, maintenance, documentation placement, equipment placement)
- **Reusable** zipper bags
- **Retrograde** returns from the field
- **Work-in-progress** protection (OEM, depot, field)
- Anti-corrosive **shelter** construction
- **Anti-Mold / anti-mildew** packaging
- Digital **Data preservation** (CDs, hard drives)
- **Solderability** preservation of electronics

More Applications

- **Totally envelope** aircraft, vehicle, item or group
- **Partial** cover (w/ perimeter seal)
- **Pallet cover** (sealed at bottom edge)
- VERTREP & **UNREP** movement
- **Heat seal bags** from bulk material
- Tri-wall, breakdown boxes, or MILVAN box **liners**
- Intercept **laminations** provide electro-magnetic shielding from radar, stray voltage, future EM and EMP weapons
- **NBC** fallout **protection**
- **Service life extension** during transport and storage w/ Intercept lined carrying cases
- **Re-usability** due to its long, stable useful life and continual cleansing action

6 Case Studies

- 1 Computer Manufacturer
 - Corrosion on Stainless Steel plotters
- 2 Computer Manufacturer
 - Corrosion issues on frames
- 3 CT Scanner manufacturer (US)
 - Corrosion from International shipping using foil bags
- 4 US Army Testing
- 5 Aerospace – long term storage issues
- 6 Lucent Technologies
 - Equipment storage and shipment
 - Testing showing Corrosion caused ESD

Where it can be used

- Subzero to tropical **temperature** extremes
- 0-100 percent **humidity**.
- Extreme **Ultraviolet** Exposure (w/SCS)
- High **Wind** Exposure (w/SCS)
- To augment **existing packaging**
- On **any** piece of equipment
- Field, Ship, Base, and OEM

When It Can Be Used

- **Short-term** or **Long-term** (10 years)
- **Shipping** and/or **Storage** (A, B, C)
- When **environmental** issues are a concern.
- When **training** is limited.
- When shipping **dimensions** are limited.
- When **access** is necessarily.
- When **flexibility** is needed.

Diversity of Products

- Intercept **Shrinkfilm**
- Intercept **Stretchwrap**
- Intercept **Fabric** - outdoor fabric laminated to film
- AS+I - Intercept **Shrinkfilm laminated to fabric**
- Bags - Heat seal flat and **Reusable Zipper Closure**
- Polyester Corrosion Intercept ® **Bags (Clear)**
- Extrusion **coated** paper and fabric
- Moisture **Barrier Bags** - SIF 2000
- **Cushion** Bags, Pouches and Rolls
- Heavy Duty **Carrying Bags** - Intercept Lined
- **Intercept MAX - Archival** boxes lined with Intercept
- PP Plastic **Corrugate** - Boxes and Sheet



**Intercept Shrinkfilm Wrapped Cranes
for TACOM by FPM**



**Mining Equipment to
West Africa**

400 kva Genset for Power West
www.energypower.com.au
ready for transport to Bass Strait Oil
Fields



GAEU 750004 0

EMPTY LIFT ONLY



EMPTY LIFT ONLY

42P3



US ARMY
WT-6

**Intercept Fabric for
Reusable Army Tug
Winch Covers**

Intercept Stretch Wrap



Compact Disk Protection from Ozone, Static Discharge, Commercial Case Off- Gassing, Mold/Mildew Damage



CD average life in typical CD jewel box is 28 months
CD average life in Intercept CD jewel box >70 years

Weapons Protection



Heat Shrinkable Aircraft

TZ:LC

22 CH-46E helos wrapped in 1 1/2 days



4th Generation Packaging

- ✓ Clean – no off-gassing, no residue
- ✓ Long-term –
 - internal storage ~10 years:
 - external ~2 years or longer with Shrinkwrap Coating System
- ✓ Savings – one-time material cost, reusable, no hazmat
- ✓ Simple – one material for everything, use like regular shrinkfilm
- ✓ Flexible – No size/shape limitation! Allows access
- ✓ Safe – no chemicals to harm personnel or equipment
- ✓ Recyclable – as colored polyethylene

FPM Inc.

A U.S. veteran owned, small business
A member of the Intercept Technology
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www.InterceptShrinkfilm.com

www.StaticIntercept.com

Coming soon: Flexible Packaging Show -
March 2004

NIPHLE Conference - May

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2001

2004

FEDERAL STANDARD 313D

3.2 Hazardous material.

- 3.2.1 Any item or chemical which is a "health hazard" or "physical hazard" as defined by OSHA in 29 CFR 1910.1200, which includes the following:
 - Chemicals which are carcinogens, toxic or highly toxic agents, reproductive toxins, irritants, corrosives, sensitizers, hepatotoxins, nephrotoxins, neurotoxins, agents which act on the hematopoietic system, and agents which damage the lungs, skin, eyes, or mucous membranes;
 - Chemicals which are combustible liquids, compressed gases, explosives, flammable liquids, flammable solids, organic peroxides, oxidizers, pyrophorics, unstable (reactive) or water-reactive;
 - Chemicals which in the course of normal handling, use, or storage operations may produce or release dusts, gases, fumes, vapors, mists or smoke which have any of the above characteristics.

MOST VCIs do NOT meet this non-hazardous